

§ 1048.510

40 CFR Ch. I (7–1–04 Edition)

(3) Use both of the duty cycles described in paragraphs (a)(1) and (a)(2) of this section if you will not restrict an engine family to constant-speed or variable-speed applications.

(4) Use only the duty cycle specified in paragraph (a)(2) of this section for all severe-duty engines.

(5) Use the 2-mode duty cycle described in the following table for high-load engines instead of the other duty cycles in this paragraph (a):

TABLE 3 OF § 1048.505—2-MODE DUTY CYCLE FOR HIGH-LOAD ENGINES ¹

Mode No.	Engine speed	Torque ²	Minimum time in mode (minutes)	Weighting factors
1	Maximum test	100	3.0	0.50
2	Maximum test	75	3.0	0.50

¹ This duty cycle is derived from the D1 cycle specified in ISO 8178–4.

² The percent torque is relative to the maximum torque at maximum test speed.

(b) If we test an engine to confirm that it meets the duty-cycle emission standards, we will use the steady-state duty cycles that apply for that engine family.

(c) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Keep the throttle at the idle-stop position.

(3) Keep engine torque under 5 percent of the peak torque value at maximum test speed.

(d) For the full-load operating mode, operate the engine at wide-open throttle.

(e) See 40 CFR part 1065 for detailed specifications of tolerances and calculations.

(f) In the normal test sequence described in 40 CFR part 1065, subpart F, steady-state testing generally follows the transient test. For those cases where we do not require transient testing, perform the steady-state test after an appropriate warm-up period, consistent with good engineering judgment.

§ 1048.510 What transient duty cycles apply for laboratory testing?

(a) Starting with the 2007 model year, measure emissions by testing the engine on a dynamometer with one of the following transient duty cycles to show that the engine meets the transient emission standards in § 1048.101(a):

(1) If you certify an engine family for constant-speed operation only, use the

transient duty-cycle described in Appendix I of this part.

(2) For all other engines, use the transient duty-cycle described in Appendix II of this part.

(b) If we test an engine to confirm that it meets the duty-cycle emission standards, we will use the transient duty cycle that applies for that engine family.

(c) Warm up the test engine as follows:

(1) Operate the engine for the first 180 seconds of the appropriate duty cycle, then allow it to idle without load for 30 seconds. At the end of the 30-second idling period, start measuring emissions as the engine operates over the prescribed duty cycle. For severe-duty engines, this engine warm-up procedure may include up to 15 minutes of operation over the appropriate duty cycle.

(2) If the engine was already operating before a test, use good engineering judgment to let the engine cool down enough so measured emissions during the next test will accurately represent those from an engine starting at room temperature. For example, if an engine starting at room temperature warms up enough in three minutes to start closed-loop operation and achieve full catalyst activity, then minimal engine cooling is necessary before starting the next test.

(3) You are not required to measure emissions while the engine is warming up. However, you must design your emission-control system to start working as soon as possible after engine

starting. In your application for certification, describe how your engine meets this objective (see § 1048.205(b)).

§ 1048.515 Field-testing procedures.

(a) This section describes the procedures to determine whether your engines meet the field-testing emission standards in § 1048.101(c). These procedures may include any normal engine operation and ambient conditions that the engines may experience in use. Paragraph (b) of this section defines the limits of what we will consider normal engine operation and ambient conditions. Use the test procedures we specify in § 1048.501, except for the provisions we specify in this section. Measure emissions with one of the following procedures:

(1) Remove the selected engines for testing in a laboratory. You can use an engine dynamometer to simulate normal operation, as described in this section.

(2) Test the selected engines while they remain installed in the equipment. In 40 CFR part 1065, subpart J, we describe the equipment and sampling methods for testing engines in the field. Use fuel meeting the specifications of 40 CFR 1065.210 or a fuel typical of what you would expect the engine to use in service.

(b) An engine's emissions may not exceed the levels we specify in § 1048.101(c) for any continuous sampling period of at least 120 seconds under the following ranges of operation and operating conditions:

(1) Engine operation during the emission sampling period may include any normal operation, subject to the following restrictions:

(i) Average power must be over 5 percent of maximum brake power.

(ii) Continuous time at idle must not be greater than 120 seconds.

(iii) The sampling period may not begin until the engine has reached stable operating temperatures. For example, this would exclude engine operation after starting until the thermostat starts modulating coolant temperature.

(iv) The sampling period may not include engine starting.

(v) For engines that qualify for the alternate Tier 2 emission standards in

§ 1048.101(d), operation at 90 percent or more of maximum power must be less than 10 percent of the total sampling time. You may request our approval for a different power threshold.

(2) Engine testing may occur under any normal conditions without correcting measured emission levels, subject to the following restrictions:

(i) Barometric pressure must be between 80.0 and 103.3 kPa (600 and 775 mm Hg).

(ii) Ambient air temperature must be between 13° and 35 °C.

Subpart G—Compliance Provisions

§ 1048.601 What compliance provisions apply to these engines?

Engine and equipment manufacturers, as well as owners, operators, and rebuilders of these engines, and all other persons, must observe the requirements and prohibitions in 40 CFR part 1068 and the requirements of the Act. The compliance provisions in this subpart apply only to the engines we regulate in this part.

§ 1048.605 What are the provisions for exempting engines from the requirements of this part if they are already certified under the motor-vehicle program?

(a) This section applies to you if you are an engine manufacturer. See § 1048.610 if you are not an engine manufacturer.

(b) The only requirements or prohibitions from this part that apply to an engine that is exempt under this section are in this section.

(c) If you meet all the following criteria and requirements regarding your new nonroad engine, it is exempt under this section:

(1) You must produce it by modifying an engine covered by a valid certificate of conformity under 40 CFR part 86.

(2) Do not make any changes to the certified engine that we could reasonably expect to increase its exhaust or evaporative emissions. For example, if you make any of the following changes to one of these engines, you do not qualify for this exemption: